

**An Excursion
into the Ecological Co-ordinates
of Language Space**

Inger Bierschenk

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**KOGNITIONSVETENSKAPLIG
FORSKNING**

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Abstract

This article should be regarded as a position paper, which outlines an ecological theory of language. The paper makes the analogy between the physical and mental growth of a human being and the rhythmic movement of writing and textual development. Thus text building is conceived of as a process developing into a structural whole. This process is inherent in the language mechanism. The paper describes the way this mechanism operates to form a structural whole out of the natural distortions in the flow of information on the textural surface.

Review

The verb 'write' can be traced back to those historic times when runes were carved on pieces of wood by somebody who was in the command of the secrets of the signs. This person was able to put himself in touch with the gods or other good or evil powers through the runes, which in their turn made him eloquent before the ignorant crowd. Clearly, for those people, to write meant to be aware of something mysterious, ghost-like, outside ourselves, which could be captured in and by the texture that came up from the carvings on the wooden surface. As time went by, though, people learnt to use the writing in more profane situations to express their thoughts and consciousness of their surrounding world. But still in the 20th century, there are people who conceive of language and use it as a means to stimulate the unconscious areas of the mind, as for example sectarians of different kinds. With this article I hope to contribute to an naturalisation (demystification) of language and writing in that I will take the reader on a voyage into the centre of text building.

Text is Development

Writing is a process similar to growing, especially because both are related to development. In the same way as an individual develops physically and mentally as a function of age, a text has a similar development (Fig. 1). The physical growth of a text is observed when text is expanding. Normally its "mental" growth becomes more and more evident and profiled by the expansion, for example emotionally and knowledge wise. As among persons, however, the mental functions do not develop exponentially with expanding mass. The dynamics of the text comes about through movements. These movements are directed forwards, and similar to an individual who interacts with some environment and gain experience from these moves, a text backs up textual material which is integrated and can be inferred as the text proceeds. By the time, the experience helps to structure both the environment and the individual, and suddenly a transformation takes place which augments the mental space. Most often development of an inner space can be associated with age, but the process is cyclic and depends to a great deal on individual variation (Fig. 2).

Text is Individual

Individuality is, for example, expressed by differences in walking styles between individuals, just the way the individual art of writing is more or less appealing. There are differences in strategy by the same individual from time to time for obtaining a certain result, or by different individuals. Similarly the pick up of information along the path may be smooth, rigid, dynamic, concentrated, etc., which together with the length of the steps give an expression of a chaotic or calm life rhythm or something in between. Think of persons you know and texts you have read, they both reflect periods of rhythmic movement and periods of rest or even stagnation.

Text is Life

The text organises itself. Its bones, joints, and muscles co-ordinate themselves to be able to move rhythmically and functionally balanced. Of course it may happen that it does too much "work out" and stretching, resulting in dislocation of some part but nature has really done a good job in letting the overall functioning be a matter of joint actions by the parts. The actions, however, have only a certain period of time to their disposal. So there has to be variation in activity to provide for periods of rest (Fig. 3).

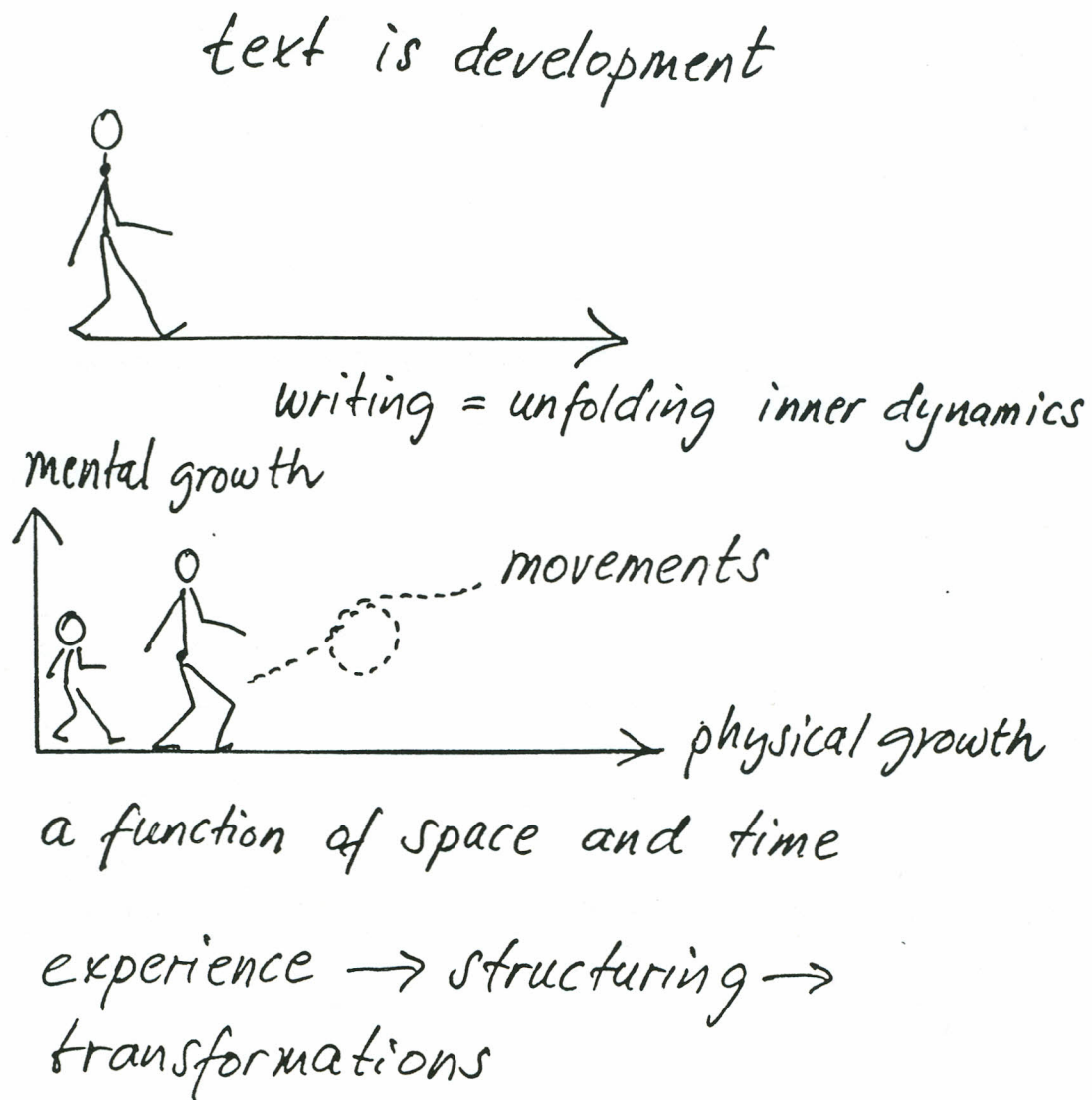
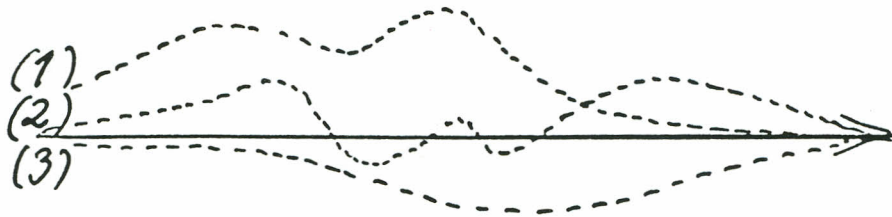


Figure 1. Text is development

text is individual



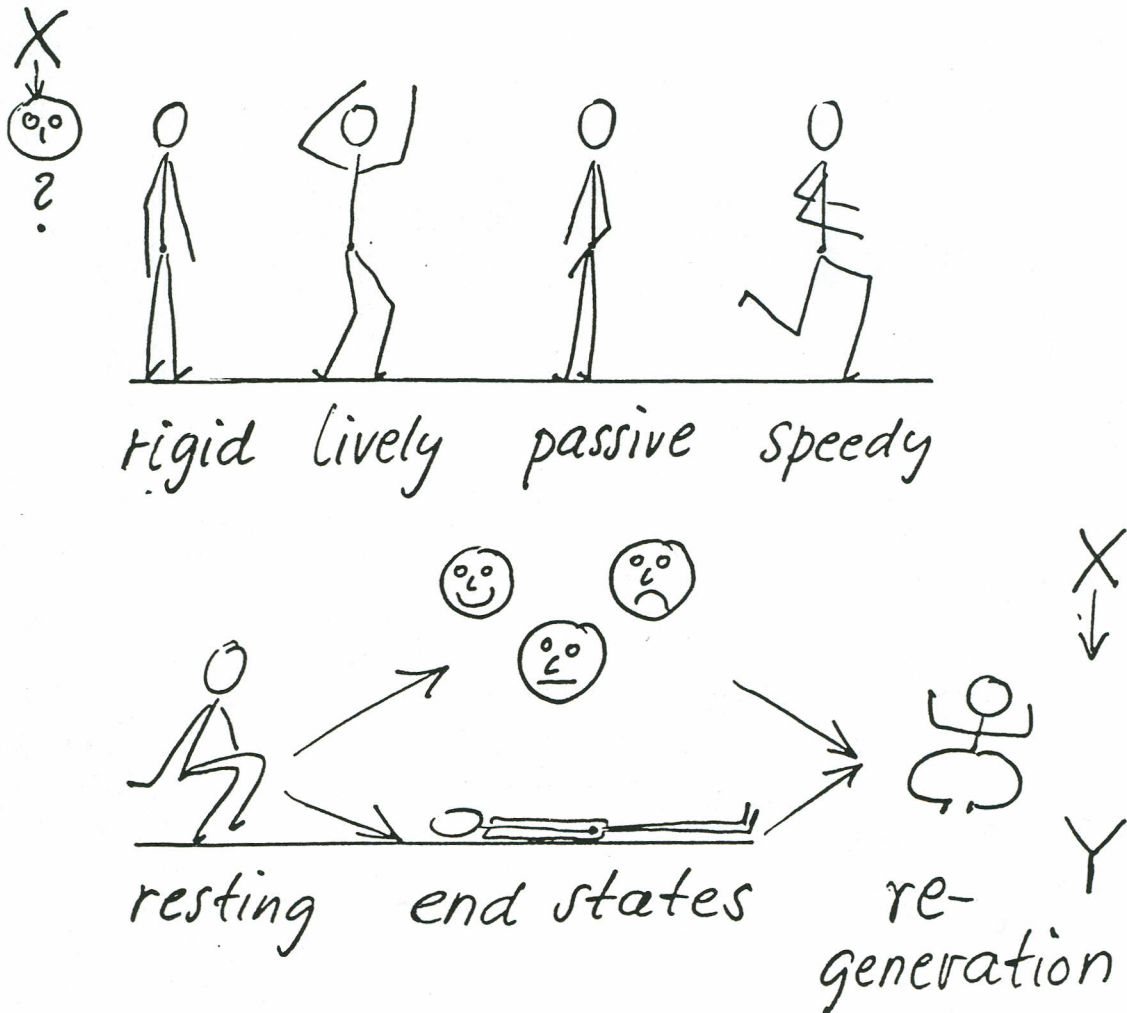
individual variation:

e.g. walking style
strategy
length of steps
information pick up

rhythmic movements

Figure 2. Text is individual

text is life



a function of age = time unit
 self-organizing + self-referential

Figure 3. Text is life

To be able to finally tell something interesting and certain about our individual/text we have to get its time or age under control. Thus like the human being, who is born with an unwritten personality (O) and to itself unknown (X) prerequisites, and who does not know where the orientation (Y) is, its mood of writing comes to some structural whole at the end. Like humans it incorporates the generation - regeneration mechanism, which means that the text is not only self-organising but also self-referential.

Text has Flow

Let us now turn to the prerequisites that make up the space of an individual or text. The making of experience is a matter of interaction with an environment (objective). It prerequisites motion, from both parts. The environment has structure and becomes known to the degree that the individual perceives it from as many angles as he needs until the environmental invariants have been established. The individual's forward moves mean that his perspective on the environment is constantly changing. But there is a certain determined array for the invariants of perspectivation (Fig. 4) to form.

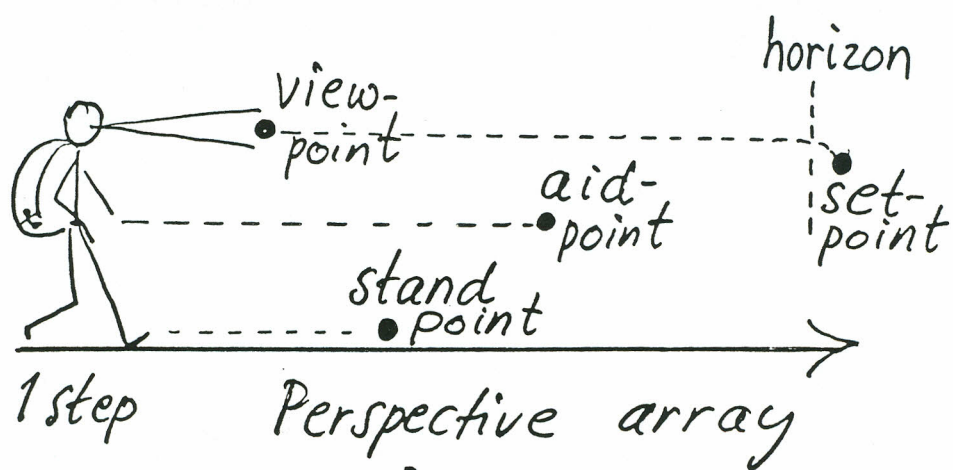
This array is determined by the physical endowment such that it has a viewpoint, a focal point picked up by the perceptual organ, namely the eye, and a standpoint determined by the feet, which have direct contact with the ground. These two points make up a co-ordinate system within which the individual or text is able to develop. Further, in between those two points there may be an aidpoint for the perspectivation, basically processed by the hand. It is namely sometimes necessary to use means to shift the perspective, especially when the viewpoint is an abstract figure or imagination. Finally, just beyond the horizon is found the setpoint, which cannot be fixed by the eye but envisioned by the mind, as a goal for an action.

In the same way as those points are not always present in the individual's perspective, they show up differentially in the text. As the individual moves, he conceives of the objectives differently. At one step they are given one specific function, at another step another function. In walking, for example, an aidpoint at one point in time becomes a standpoint at another, and the standpoint a viewpoint. It depends on the shifts and twists of the body as well as the neck. The dynamics of the perspectivation process lies in the field of tension where the information flow of the environment and the energy flow of the individual meet.

Text has Intentionality

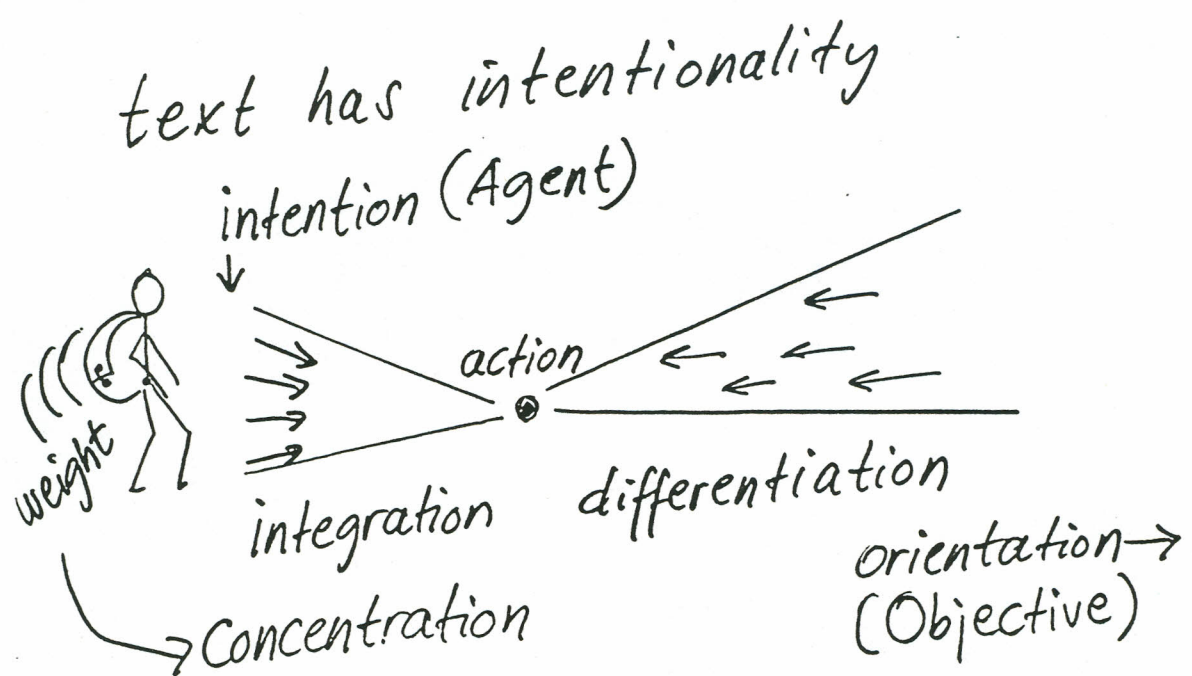
The individual and the environment are not equal, since the latter is qualified by the former (Fig. 5). Thus the dynamic-functioning is governed by the individual energy, set in motion at each step. In principle, the differentiation process has as its purpose to integrate information. The effects on the walker is that his experience of the surroundings grows and becomes heavier over time and that the rucksack is steering his further steps. The heavy steering part of the text is called the Agent because it is controlling the extent to which the Objectives are flowing or concentrated. When a text is like a walker with a heavy rucksack, then there is a high concentration of textual mass before the walker takes his step, that is, before the verb. It is quite clear that the intentionality of textual movement means a striving towards balance between two unequal parts.

text has flow



energy flow $\rightarrow \begin{pmatrix} D_y \\ n_a \\ m \\ i c s \end{pmatrix} \leftarrow$ information flow

Figure 4. Text has flow.



Agent has controlling function →
 $A \rightarrow a \rightarrow O$

Figure 5. Text has intentionality

Text becomes Wholeness

Demarcation Rules

Text writes itself algorithmically, which implies that we have to expect conditions of machinery in language (Fig. 6). Thus the first thing to do for an analyser is to specify the time unit, here called the period, within which there may be more than one start. These demarcations are made by means of a small dictionary of sentence markers (?!) and clause markers (, : ; and junctions like 'and', 'which', and 'why'). Secondly, a dictionary of the three different pointer types is established. It could be noted that an overwhelmingly high frequency of pointers specify the Ground component, which is quite realistic against the ecological background presented. A third dictionary specifies verbs morphologically as stems and inflection endings. As 'verb' is defined a simple string in its finite or infinite form.

By the verb definition, semantic meaning, for example, has no relevance, nor has intransitivity. The verb acts as a functional constant co-ordinating the Agent part and the Objective part. The step indicated by a verb is consequently called a functional clause. As soon as a verb has been identified, there is, explicit or not, only one A-variable manifested and at least one O-variable. Further, dummy variables on both sides of the verb are possible. The functional clause thus provides the linkage to the language space of the individual text. It is a marker of elasticity.

To tag the variables, the analysis procedure uses a two-digit code (00 - 90) which allows for further differentiation within the components. In principle, the correct A-O coding is carried out on the basis of demarcation- and pointer dictionary only.

Restriction Rules

Because of the irreversibility in the Objective flow and the displacement of the Objective weight over to the Agent, there are restrictions on the analysis by pointers. In the flow, the objective of highest order (80) restricts the coding of the following, and so on in falling order. Moreover, a pointer dislocated to the agent side points to the agent itself under the conditions that it is not an initial string (see below). A third kind of restriction lies in the coding based on a p-shifted verb. P-shift means that the agent part is located in the space (X_p) which imposes a reversibility on the objective part. Thus the objectives shift their functional position. These three kinds of restrictions are illustrated in Figure 7.

Transformation Rules

A transformation takes place by the start/restart of a period and under two conditions: (1) that the agent is not identified (\emptyset), and (2) that the verb is active (= not p). The second condition is tested by the endings dictionary. The first has two alternatives, either (1) that the clause marker opens up an empty slot before the verb (= no string between clause marker and verb is found), or (2) that a preposition in initial position closes the slot (= strings between preposition and verb). In both cases an insertion of the transformed agent (X_a) is required. The first case is an indication of experience, while the second points at contextual restrictions. That is why the agent-pointing preposition is re-tagged to 10 and the clause marker to 20 to differentiate the X-agent. Transformation rules are visualised in Figure 8.

text becomes wholeness

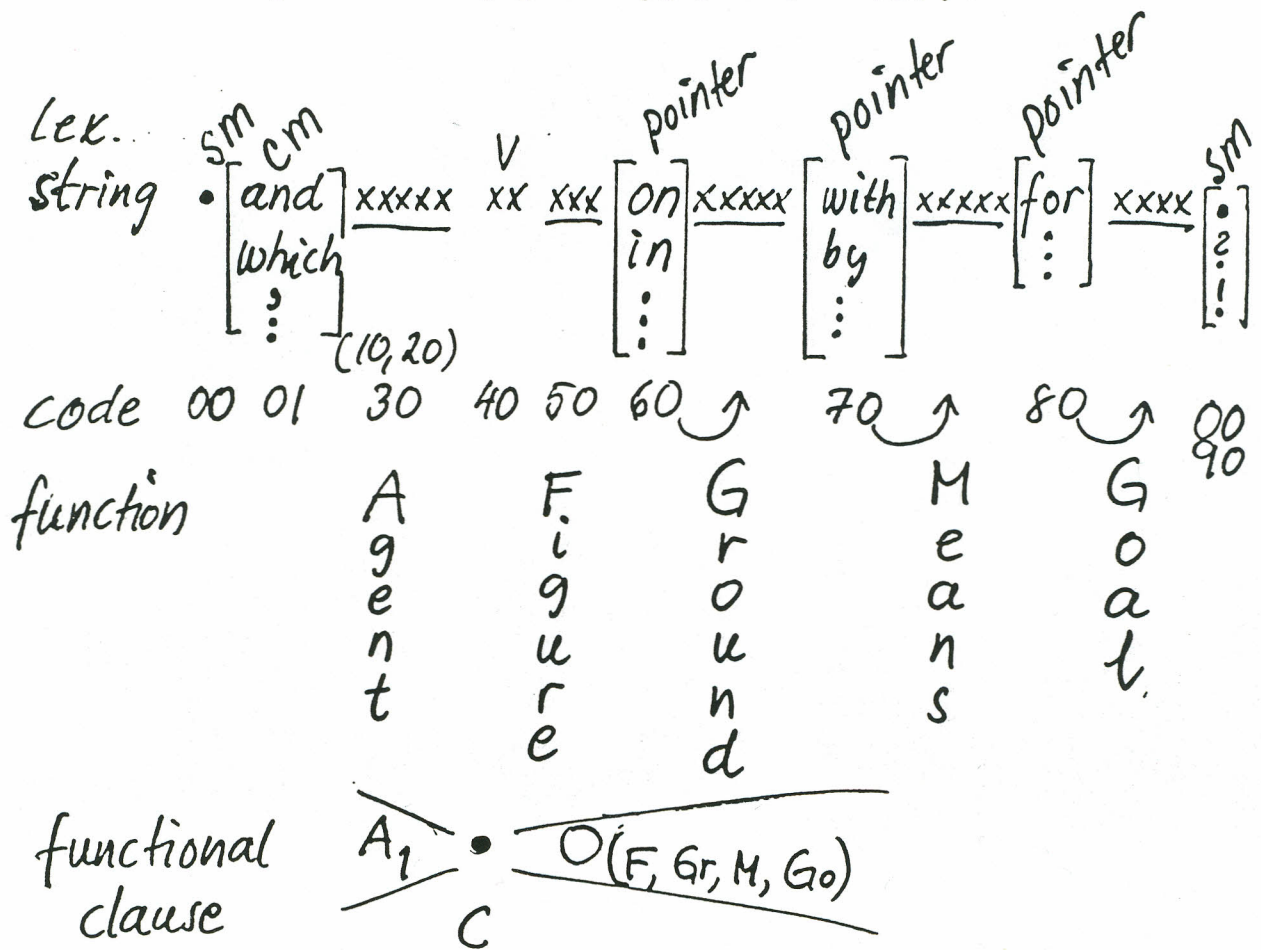


Figure 6. Text becomes wholeness

Restriction rules

dislocation =
integration

irreversibility =
constraining

- xxxx in xxx xx xxx for xxx with xxx .
30 ~~60~~ 40 50 80 80
 30

40 with xxxx on xxx for xxxx
70 70 80

- (X_p) xxxx V_{pass} under xxx of xxxx .
30 60 40 60 60

Figure 7. Restriction rules

Transformation rules

- Why (X_a) should I?

20	30	40	50	= experience
----	----	----	----	--------------
- | | | | |
|---------------|----|---------|-----------------|
| In ----- | } | (X_a) | |
| With ----- | | | |
| At ----- | | | |
| Between ----- | | | |
| For ----- | | | |
| 10 | 30 | 40 | ----- = context |

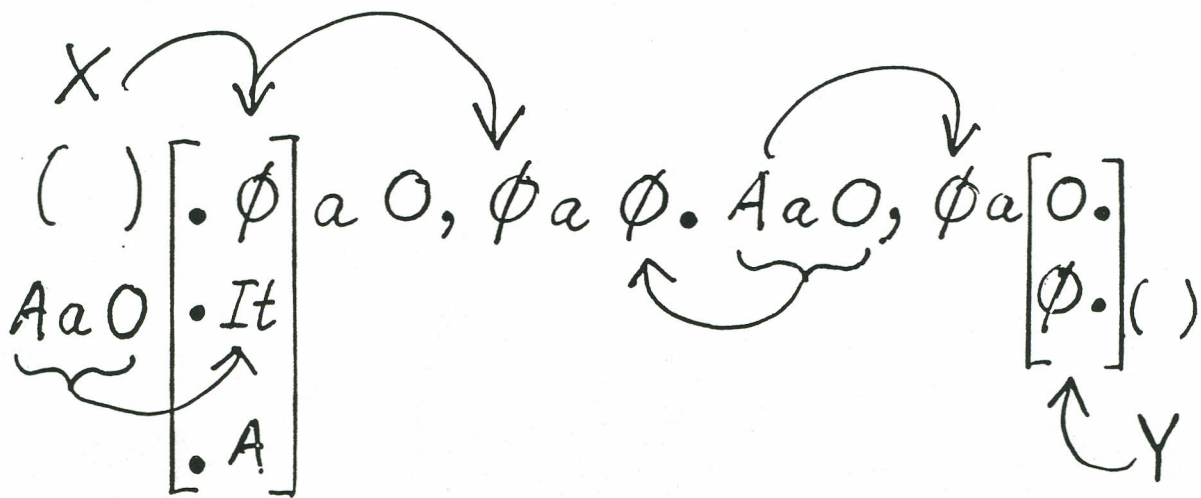
Figure 8. Transformation rules

Convergence rules

dummy variables ϕ & ϕ

stretching function of the verb

distortion on textural surface



texture + structure = convergence

Figure 9. Convergence rules

Convergence Rules

The aim of the analysis is to provide the synthesiser with a structural whole manifested as a textural whole because of the linear functioning of the reading mechanism. Thus as the text moves on, there are distortions left behind on the textural surface functioning as "peep-holes" into the structure, that is, the differentiating and integrating processes conserved over the entire text. By a certain set of rules, those holes shall be filled with the material being their spatial reference. This means that the textual strings inserted in the dummy slots cannot be momentarily interpreted regardless of at what point in time they were processed.

Convergence in this sense means that two functional entities shall be co-ordinated to form a unity while conserving the asymmetrical relations of the inner dynamics (Fig. 9). In principle, the text is unbounded. The algorithmic function determines the limits within which this can be known. The variables are the representations of the unboundedness.

Final Remarks

This presentation is meant to be a digest of the development of a new theory about the dynamics of text building behaviour. The theory has developed over a period of approximately twenty years. Theoretical developments and experimental applications have been reported in the series *Kognitionsvetenskaplig forskning* (Cognitive Science Research), ISSN 0281-9864. It is available in hard copy or microfiche by the ERIC information system.

The operationalisation of the theory and its methodology has developed into a system of computer programs called PERTEX. The programs have been designed and implemented by Helge Helmersson, Cognitive Science Research Unit, Lund University Sweden. At the moment, PERTEX is operational for practical use in Swedish and English. Prototypical demonstrations can be given in the following languages: Latin, German, French, Italian, Danish, and Finnish.

Author Notes

The paper has been presented at the 25th International Congress of Psychology, held in Brussels July 19-24, 1992. It is a didactical version of a theoretical paper, entitled "The pendular Movement of Text Building", which was presented in the symposium "Computerized Research Methods for Psychologists" at this congress. This paper served as introductory didactical material during a four days exhibition of the PERTEX system. The demonstration was arranged on site with the kind assistance of the Congress President Géry d'Ydewalle.